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INSTRUMENTS THAT STAY ACCURATE
CUSTOMER SERVICE

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Pride in Service
NASM MEMBER

OEM SERVICE BULLETIN
#12-75
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MODEL 303-3XL

Electronic VOM

NOTICE

This publication is intended solely for use by Simpson Authorized Service Centers. When this document is made available to other than Simpson Authorized Service Centers, it is done so strictly as a courtesy and does not constitute authorization to repair, calibrate, and/or in any way service Simpson products. REPRODUCTION FOR USE BY OTHERS IS PROHIBITED.

To the best of our knowledge and at the time written, the information contained in this Service Bulletin is technically correct and the procedures accurate and adequate to effect the repair and to conduct the performance tests required to assure the unit's compliance with its original advertised specifications.

Simpson Electric Company supplies this service information as a courtesy to the recipient and neither assumes nor accepts any responsibility for any personal injury or equipment damage that may occur during or as a result of tests, wherever performed, whether performed in whole or in part by the recipient of this information; persons employed by the recipient of this information; or any other person that chooses to use the information contained herein; and whether or not using tools and equipment recommended by Simpson.

WARNING

Many of the tests required to troubleshoot, repair, and calibrate this equipment are inherently hazardous. Therefore, troubleshooting, repairing, and calibrating must be performed only by Simpson Authorized Service Centers, and if any such Service Center fails to put the equipment in satisfactory condition, then the factory (National Service Manager) should be promptly notified.

NOTE: Tolerances referenced in the calibration information are the original manufacturer's calibration specification which are maintained on new equipment to assure compliance with the unit's advertised specifications. Repairing equipment used in the field in a wide variety of environments (over a period of time) to these specifications may not be practical or necessary because of cost. However, it is essential that the advertised specifications as given in the operator's manual be met after repairs are made.

SAFETY INFORMATION

Certain Caution and Warning notes are included in appropriate places in this bulletin. These notes are posted as a reminder to Service Personnel to adhere to safe service practices and return the repaired instrument to the customer as the quality product the original design provided.

WARNING

This Instrument is designed to prevent accidental shock to the operator when properly used. However, no engineering design can render safe an instrument that is used carelessly. Therefore, the following notes must be read carefully and completely, before making any measurements or adjustments. Failure to follow directions can result in a serious or fatal accident.

SHOCK HAZARD: As defined in American National Standard, C39.5, Safety Requirements for Electrical and Electronic Measuring and Controlling Instrumentation, a shock hazard shall be considered to exist at any part involving a potential in excess of 30 volts rms (sine wave) or 42.4 volts DC or peak and where a leakage current from that part to ground exceeds 0.5 milliampere, when measured with an appropriate measuring instrument defined in Section 11.6.1 of ANSI C30.5-1974.

NOTE: The proper measuring instrument for the measurement of leakage current consists essentially of a network of a 1500 ohm non-inductive resistor shunted by a 0.15 microfarad capacitor connected between the terminals of the measuring instrument. The leakage current is that portion of the current that flows through the resistor. The Simpson Model 229 Series-2 AC Leakage Current Tester meets the ANSI C39.5 requirements for the measurement of AC leakage current and can be used for this purpose. To measure DC leakage current, connect a 1500 ohm non-inductive resistor in series with a Simpson 0-500 DC microammeter and use this as the measuring instrument.

Refer to GENERAL SAFETY PRECAUTIONS on next page.

GENERAL SAFETY PRECAUTIONS

The unit is to be serviced only by personnel qualified to recognize shock hazards and trained in the safety precautions required to avoid possible injury. Refer to SHOCK HAZARD definition.

Do not work alone when making measurements where a shock hazard can exist. Notify another person that you are, or intend to make such measurements.

Remember, voltages might appear unexpectedly in defective equipment. An open bleeder resistor can result in a capacitor's retaining a dangerous charge. Remove all power and discharge all capacitors in the circuit being measured and remove all power from the unit before making connections or disconnections. The Instrument itself is well protected against electrical overload. However, the above precautions are wise even in the laboratory, and especially in field usage of the Instrument where many strange or unknown safety hazards might prevail.

Locate all voltage sources and accessibility paths prior to making any measurements or connections.

For your own safety, before each use, inspect the test leads, prods, connectors and power cable for cracks, breaks, or crazes in the insulation. If any defects exist, destroy and replace the defective item(s) immediately.

Do not make measurements in a circuit where corona is present. Corona can be identified by a pale blue color emanating from sharp metal points in the circuit or a buzzing sound, or the odor of ozone. In rare instances, such as around germicidal lamps, ozone might be generated as a normal function. Ordinarily, the presence of ozone indicates presence of high voltage, and probably a malfunction of some kind.

Hands, shoes, floor and workbench must be dry. Avoid making measurements under humid, damp or other environmental conditions that could effect the dielectric withstanding voltage of the test leads or the Instrument.

For maximum safety, do not touch test leads, circuit, or Instrument while power is applied to the circuit being measured.

Use extreme caution when making measurements in an rf circuit where dangerous composite voltage could be present, such as in an rf amplifier.

Do not use test leads which differ from those originally furnished with the Instruments.

Before the Instrument is used for AC operation, make sure that the "third wire" on the AC power cord is connected to an earth or power line ground.

Do not exceed the maximum input or circuit-to-ground voltage ratings of the Instrument. To do so endangers personal safety and may also damage the Instrument.

CALIBRATION

GENERAL

Maintenance personnel should be familiar with the operating procedures, performance specifications, physical make-up and theory of operation before testing, calibrating or repairing the Instrument.

Because of the polarity indicating and automatic polarity switching circuits, the model 303-3XL is unlike most conventional high impedance VOMs and requires some additional tests.

DISASSEMBLY PROCEDURES

Case Removal

1. Remove the battery compartment cover.
2. Remove the 4 (four) screws located at the four corners of the case.
3. Pull the case assembly and the case cover assembly apart. Reverse these procedures to replace.

Printed Circuit Board Removal

1. Pull off the Function Selector and OHMS ADJ. knobs. (These are push-on types).

NOTE

Be careful when prying knobs off not to chip the knobs or case.

2. Remove the Range Selector knob by loosening the hexagonal set screw.
3. Remove the nylon nut that secures the Range Selector shaft to the case.
4. Remove the two nuts from the meter terminal studs on the surface of the circuit board.
5. Pull the circuit board toward the rear carefully. The foil of the circuit board, and switch components are now accessible for repair or replacement.
6. Reverse these procedures when reassembling. Be careful when tightening the nuts on the meter studs not to break or loosen the studs. Be sure the studs are secure to the panel before replacing the circuit board.

Visual Inspection

When a unit is in for repair, a visual inspection will often reveal the problem area and save valuable service time.

1. Inspect the Function Selector:

   A. Make sure it has positive indexing.

   B. Check that the shape and location of the rotor blade has not changed.

   C. Make sure that all wiring and circuit components are properly soldered to the Selector terminals and are not shorting to other components.

2. Check the Range Selector as above.

3. Inspect the ZERO ADJ., OHMS ADJ., and other controls for any worn or rough spots.

4. Check the printed circuit board for cracks/torn foils by using a bright light under the board and a magnifying glass.

5. Check board components for burned resistors or poorly soldered connections.

CALIBRATION PROCEDURES

Required Test Equipment

1.	DC Voltage Standard	0-1kV (0.2% accuracy)
2.	AC Voltage Standard	0-1kV (0.2% accuracy)
3.	DC Current Standard	0-10A (0.2% accuracy)
4.	AC Current Standard	0-1A (0.2% accuracy)
5.	Resistance Decade (precision)	1,10,100,1k,10k,100k,1MEG, 10MEG (0.4% and .5W)
6.	Digital Multimeter (DMM)	Simpson Model 464 or Equiv.
7.	Battery Charger	Simpson Cat. No. 12248

Pre Calibration Procedures

1. Anti-static meter window and adjust the mechanical zero.

2. Set the 464 DMM to the 200k ohm range and measure between the collector of transistor Q1 (positive lead) and the emitter of Q1 and Q2 (negative lead). The values should be approximately the same.

3. Disconnect the purple-and-white wire from diode D6 and with the 464 DMM check diodes D5 and D6 for proper operation and insertion.

4. Reconnect the purple-and-white wire.

5. Check for continuity between the metal spring on R23 and the COMMON input jack.

Battery Power System/Battery Charger Check Procedure

1. Install a known good nickel-cadmium rechargeable D size cell. Observe proper polarity. Battery voltage must be 1.25 ±.05V with a load of 100mA.

2. Connect DMM (set to 2VDC range) to the charger jack of the Instrument under test.

3. Check the battery voltage reading on the DMM. It should be greater than 1.20 volts on the ZERO CENTER, ±DC, AC, L.P. OHMS and + & - DIODE OHMS positions.

4. Rotate the Function Selector to the BATT. test position. The DMM readout should now be 0.

5. Plug the Battery Charger/AC Adapter into a 120V, 60Hz ac outlet.

6. Connect the Battery Charger to the Instrument.

7. Let the battery charge for 16 hours with the Instrument off.

8. The battery should now be able to operate the Instrument for 20 hours. If not, the Battery Charger should be replaced.

DC Inverter Test

1. Set DMM to 20VDC range and turn the Range Selector switch to the OFF position.

2. Connect the black test lead of the DMM to the common (-) of the Instrument and the red test lead to point D (see Fig. 4-1).

3. The DMM should read 0.

4. Rotate the Range Selector to the 300V position.

5. Check the DMM reading. It should be approximately +7.25V (depending on the battery voltage).

6. Rotate the Function Selector to the BATT. position.

7. Check the DMM, the reading should be 0.

8. Return the Function Selector to ZERO CENTER. The DMM reading should return to approximately +7.25V.

9. Disconnect red lead from test point D and connect it to test point E.

10. Check the DMM, it should be reading approximately -7.25V (depending on the condition of the battery).

11. Rotate the Range Selector to OFF, the DMM should read 0.

12. Disconnect all test leads. This completes the Pre-Calibration Procedures.

Functional Test

Perform the steps of Table 4-1 in the indicated sequence. If the Instrument fails to pass a test, refer to the proper test and/or calibration procedures.

Table 4-1. Functional Test Procedures of Model 303-3XL

STEP NUMBER	FUNCTION SELECTOR POSITION	RANGE SELECTOR POSITION	ZERO ADJUST SETTING	OHMS ADJUST SETTING	LED POLARITY INDICATORS	INSTRUMENT INDICATION DIVISIONS ON SCALE ARC"10"
1	ZERO CENTER	OFF	ANY	ANY	BOTH LEDS OFF	ZERO MECHANICALLY
2	BATT.	OFF	ANY	ANY	BOTH LEDS OFF	66 TO 72
3	±DC	300V	FULLY CCW	ANY	-DC LED FLASHES	AT LEAST 50
4	±DC	300V	FULLY CW	ANY	ON LED FLASHES	AT LEAST 50
5	±DC	300V	SET TO 10% F.S.	ANY	ON LED FLASHES	10
6	±DC	300V	SET TO 1% F.S.	ANY	ON LED FLASHES	1
7	±DC	300V	SET TO ZERO	ANY	ON LED FLASHES	0
8	±DC	ALL RANGES	SET TO ZERO	ANY	ON LED FLASHES	
9	ZERO CENTER	300V	SET TO ZERO	ANY	ON LED FLASHES	60 OR MORE WITH R33 SET CW
10	ZERO CENTER	300V	SET TO ZERO	ANY	ON LED FLASHES	40 OR LESS WITH R33 SET CCW
11	ZERO CENTER	300V	SET TO ZERO	ANY	ON LED FLASHES	ADJUST R33 FOR 50
12	ZERO CENTER	ALL RANGES	SET TO ZERO	ANY	ON LED FLASHES	SHOULD READ 50 ±1
13	AC	30mV	SET TO ZERO	ANY	ON LED FLASHES	100 OR MORE BY TOUCHING "+" JACK
14	AC	.3V	SET TO ZERO	ANY	ON LED FLASHES	1 OR LESS BY SHORTING "+" TO COMMON
15	±DC	3V	SET TO 30% F.S. (CW)	ANY	ON LED FLASHES	30
16	AC	3V	DO NOT CHANGE	ANY	ON LED FLASHES	33
17	AC	1V	DO NOT CHANGE	ANY	ON LED FLASHES	10 TO 11

Test Procedure Continued on Next Page

Table 4-1. Functional Test Procedures of Model 303-3XL (continued)

STEP NUMBER	FUNCTION SELECTOR POSITION	RANGE SELECTOR POSITION	ZERO ADJUST SETTING	OHMS ADJUST SETTING	LED POLARITY INDICATORS	INSTRUMENT INDICATION DIVISIONS ON SCALE ARC 10
18	±DC	.1V, 1V, 10V, 100V OHMS RANGES CURRENT RANGES	SET TO 30%	ANY	ON LED FLASHES	30 ±1
19	±DC	30mV, .3V, 3V 30V and 300V	SET TO 30%	ANY	ON LED FLASHES	30 ±1
20	L.P. OHMS	ALL VOLTAGE & CURRENT RANGES	SET TO ZERO	ANY	ON LED FLASHES	0
21	L.P. OHMS	ALL OHMS RANGES	DO NOT CHANGE	SET CCW	ON LED FLASHES	FROM 60 to 75
22	+ DIODE OHMS	Rx1 MEG	DO NOT CHANGE	SET CCW	ON LED FLASHES	FROM 60 to 75
23	+ DIODE OHMS	Rx1 MEG	DO NOT CHANGE	SET TO ∞	ON LED FLASHES	100
24	− DIODE OHMS	ALL OHMS RANGES	DO NOT CHANGE	SET TO ∞	-DC LED FLASHES	100

LED Tests

1. Move the Function Selector to the ±DC position and the Range Selector to the 300V position, and zero the meter.

2. Check the "ON" LED flashing on all nineteen voltage, current, and resistance positions with the Function Selector in ZERO CENTER, ±DC, AC, and L.P. OHMS positions.

3. With the Function Selector in the -DIODE OHMS position, check that the "ON" LED flashes as the Range Selector is rotated through the nine voltage ranges and three current ranges.

4. With the Function Selector in the same -DIODE OHMS position, check that the "-DC" LED flashes as the Range Selector is rotated through the seven resistance ranges.

5. Turn the Function Selector to the ±DC position and set the ZERO ADJ. control to its max. CCW position. The "-DC" LED should flash through all nineteen voltage, current, and resistance ranges.

6. Rotate the Function Selector to the BATT. test position and Range Selector to OFF. Both LEDs should be off and the meter pointer should be between 6.0 and 7.5 on the 10 arc.

7. Check the LED switchover region by rotating the Function Selector to the ±DC position and the Range Selector to the 300V position. Rotate the ZERO ADJUST control CW. The "-DC" LED should stop flashing and the "ON" LED should start. If the switchover region is wider than 10 divisions or less than 2 divisions, check the value of R41.

DC Voltage Calibration

1. Check the battery of the model 303 to be sure that it meets specifications.

2. Allow all test equipment a warmup period of at least 30 minutes.

3. Set the ZERO ADJ. control for a zero reading on the meter.

4. Connect the dc voltage standard to the model 303 using test probe Model #00182. Set the probe switch to ISOLATION DC.

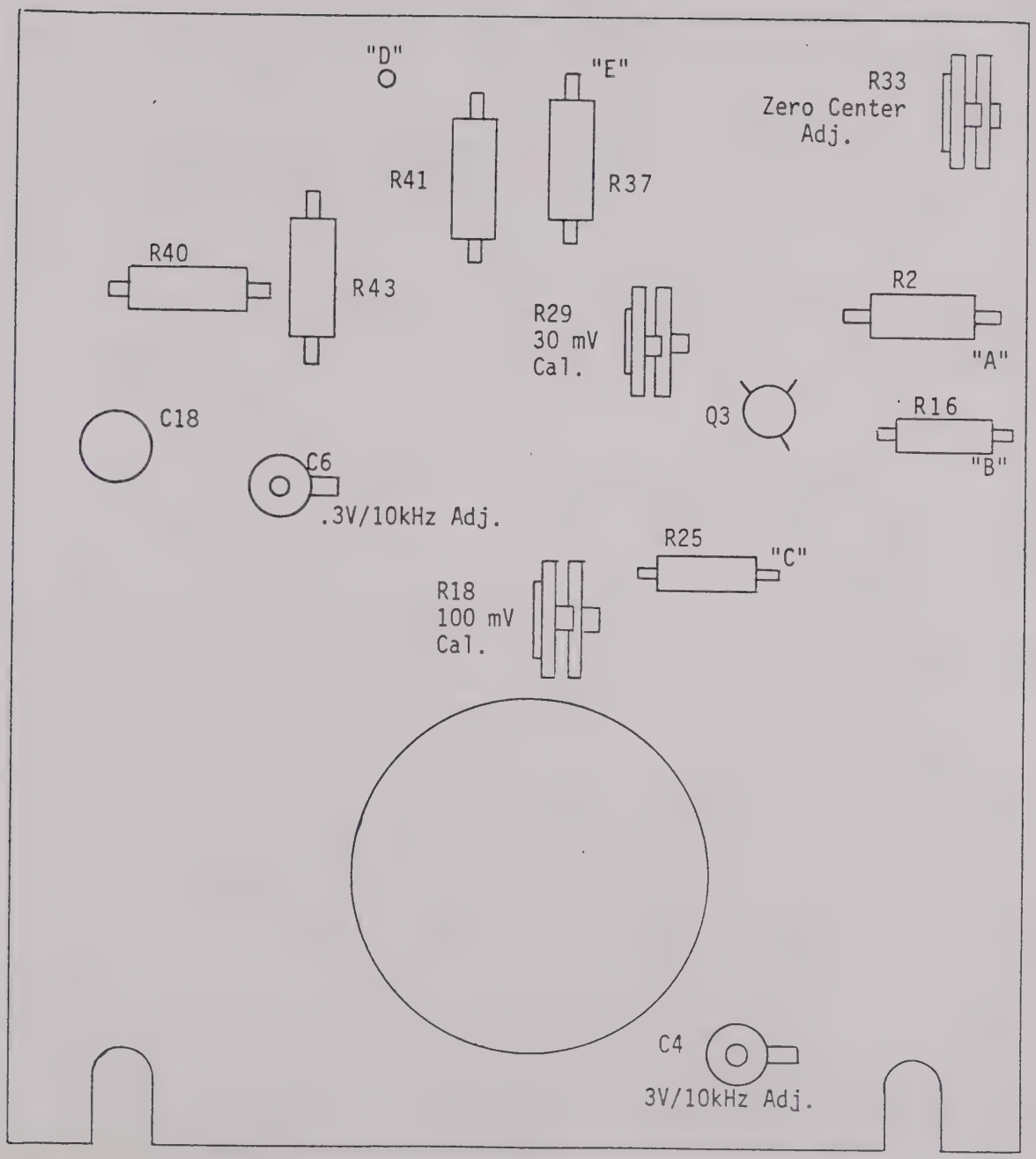
5. Set the Function Selector of the model 303 to ±DC.

6. Set the Range Selector to the 30mV range.

7. Adjust the dc standard to 28.5mV.

8. Check the meter. If the pointer does not indicate 28.5mV, adjust potentiometer R29 (refer to Fig. 4-1).

9. Reverse the connections from the dc voltage standard. The reading should be the same and the "-DC" LED should flash. If the reading is different, check the zero in step 3.



NOTE: Test points are identified with quotation marks - "A"

Fig. 4-1. Location of Test Points and Calibration Controls

Model 303-3XL

10. Reverse the leads again and set the Range Selector to the .1V range.

11. Set the dc voltage standard to 90mV.

12. Check the meter. If the pointer does not indicate a 9.0 on the 10 scale, adjust potentiometer R18. (Do not readjust R29 without also readjusting R18 as they are interdependent.)

AC Voltage Calibration

1. Set the switch on the test probe to DIRECT and connect the ac voltage standard to the model 303.

2. Set the Function Selector to AC and the Range Selector to the 30mV position.

3. Set the ac voltage standard for 28.5mV output at 400Hz.

4. Check the meter. The pointer should indicate 9.0 ±1 subdivision on the 10 arc.

5. Set the meter to the .1V range.

6. Set the ac voltage standard to 90.0mV at 400Hz.

7. The meter pointer should again indicate 9.0 ±1 subdivision on the 10 arc.

Frequency Compensation Adjustment

1. Install the model 303 in a case modified to expose capacitors C4 and C6 (while maintaining Instrument shielding).

2. Set the Range Selector to the 3V range and apply 2.85VAC @20kHz.

3. Adjust capacitor C4 for a reading of 9.0 ±.5 subdivisions on the 10 arc.

4. Apply .9VAC @20kHz on the 1V range.

5. Adjust capacitor C6 for a reading of 9.0 ±.5 subdivisions on the 10 arc.

6. Replace the modified case with a regular case.

7. Install the fuse and battery cover. The Instrument must be shipped with the same probe (model 00182) used during calibration.

DC Current Calibration

Only the 1A and 10A current ranges can be calibrated. The procedure for this is shown below.

1A & 10A Ranges

1. Connect the model 303 to a dc current standard and set the Function

Selector to ±DC. Use heavy test leads to make the connection (catalog #00115 or equivalent).

2. Set the Range Selector to the 30mA/1A/10A position.

3. Connect the positive lead from the dc current standard to the 10A jack.

4. Apply 9A.

*5. The meter should read 9.0 ±1 division on the 10 arc. If not, unsolder the shunt on one end and raise or lower it out of or into the jack connector as necessary to provide the proper reading.

6. Connect the positive lead from the current standard to the 1A jack.

7. Apply .9A.

8. The meter should read 9.0 ±1 division on the 10 arc. If not, loosen the screw in the 1 amp shunt slider and move the slider as necessary to provide the proper reading.

9. Turn the dc current standard off and disconnect it when finished adjusting the shunts.

AC Current Calibration

AC current measurements are made with exactly the same shunts used for dc current measurements. After calibrating the ac voltage functions and the dc current shunts as above, the ac current ranges are calibrated.

PERFORMANCE TESTS

Tracking Accuracy Check

1. Set the model 303 to the .1V range.

2. Connect the dc voltage standard to the model 303 with the test probe switch on ISOLATION DC.

3. Apply the voltages as shown in Table 4-2 and check for operation within the maximum allowable error.

4. Disconnect the test leads when the test is completed.

DC Volts Accuracy Check

Table 4-3 lists the dc standard voltages necessary to check the accuracy of all the ranges from .3 to 300 VDC. The error encountered should not exceed that listed.

*NOTE. Allow the shunt to cool to room temperature (after moving it) before proceeding to check the calibration.

Table 4-2. Tracking Accuracy

DC VOLTAGE STANDARD OUTPUT	INDICATION ON THE SCALE ARC "10" OF THE MODEL 303	MAX. ERROR ALLOWABLE IN DIVISIONS INDICATED
100 millivolts	10 (Full scale)	±3/4
90 "	9	±0
80 "	8	±3/4
70 "	7	±3/4
60 "	6	±3/4
50 "	5	±3/4
40 "	4	±3/4
30 "	3	±3/4
20 "	2	±3/4
10 "	1	±3/4
0 "	0	±0 (Zero Adjusted)

NOTE: 1 division on scale arc "10" is equal to 1% of full scale

1. Connect the dc voltage standard to the model 303 with the test probe switch in the ISOLATION DC position.
2. Set the Function Selector to the ±DC position.
3. Follow Table 4-3 and be sure that the meter indication meets the tolerance requirements as stated.
4. Disconnect the test probe when the test is completed.

WARNING

The following test involves voltages that can be dangerous and fatal. Observe the GENERAL SAFETY PRECAUTIONS listed in the Preface at all times.

1KVDC Range Test

1. Set the Range Selector to the 300V/1000V position.
2. Connect the dc voltage standard to the model 303 COMMON and 1000VDC front panel jacks.
3. Apply 900V.
4. The pointer should rest at 9.0 ±1.5 subdivisions on the 10 arc.
5. Turn the dc voltage standard output to zero and disconnect the test leads when the test is completed.

DC Current Accuracy Check

1. Connect the model 303 to a dc current standard.
2. Set the model 303 Function Selector to the ±DC position.
3. Set the Range Selector, and the dc current standard to the values shown in Table 4-4. Check for operation within the indicated limits.

AC Volts Accuracy Check

1. Connect an ac voltage standard to the COMMON and + inputs of the model 303.
2. Set the Function Selector to the AC position.
3. Set the Range Selector and ac voltage standard as shown in Table 4-5. Check for operation within the indicated limits.

AC Current Accuracy Check

1. Connect an ac current standard to the model 303.
2. Perform the steps in Table 4-6 with an input frequency of 400Hz. Check for operation within the indicated limits.
3. Check the 1A and 10A ranges at 200Hz and allow a maximum error of ±1.0 division.

Resistance Ranges Accuracy Test

1. LP Ohms Ranges

   A. Set model 303 Function Selector to LP OHMS, Range Selector to Rx10K, short input + jack to -COMMON jack and adjust ZERO ADJ.

   B. Remove short from input jacks. Observe Instrument indication and adjust OHMS ADJ. for infinity (full-scale) indication.

   C. Connect the Resistance Decade to the model 303 COMMON and + jacks.

Table 4-3. DC Volts Accuracy Test

STEP	RANGE	VOLTAGE STD OUTPUT (V)	IND.	MOD. 303 (ON SCALE 10)/TOL. (DIV.)
1	30mV	0000		0.0/0
2	.1V	0000		0.0/0
3	.3V	.2850		9.0/±1.5
4	1V	.9000		9.0/±1.5
5	3V	2.850		9.0/±1.5
6	10V	9.000		9.0/±1.5
7	30V	28.50		9.0/±1.5
8	100V	90.00		9.0/±1.5
9	300V	285.0		9.0/±1.5

Table 4-4. DC Current Accuracy Test

STEP	RANGE	CURRENT STD OUTPUT	IND.	MOD. 303 (ON SCALE 10)/TOL. (DIV.)
1	30μA	28.5μA		9.0/±1.5
2	1mA	.900mA		9.0/±1.5
3	30mA	28.5mA		9.0/±1.5
4	1 A	.9 A		9.0/±1.0
5	10 A	9.0 A		9.0/±1.0

D. Set model 303 Range Selector and Resistance Decade to positions as required in steps 1 to 12 of Table 4-7. Observe indication and note the error of the Instrument in accordance with Table 4-7 listings.

2. +DIODE OHMS and -DIODE OHMS

A. With zero adjusted as in step 1 above, set model 303 Function Selector to +DIODE OHMS and Range Selector to Rx10K. Check Instrument indication with input jacks open: readjust OHMS ADJ. for full scale indication if required.

B. Set Function Selector to -DIODE OHMS. The Instrument indication shall be unchanged, exactly full scale as set above.

C. Perform steps 13 to 18 of Table 4-7 and observe indication and error of the Instrument as required.

Table 4-5. AC Volts Accuracy Test

STEP	RANGE	ACV STD. OUTPUT (V)	ACV STD. OUTPUT (Hz)	MOD. 303 IND. (ON SCALE 10)/TOL. (DIV.)
1	30mV	SHORT		0/0
2		.0285	20	9.0/±2.5
3		.0285	400	9.0/±1.75
4		.0285	20K	9.0/±2.5
5	.1V	.0900	20	9.0/±2.5
6		.0900	400	9.0/±1.75
7		.0900	20K	9.0/±2.5
8	.3V	.2850	20	9.0/±2.5
9		.2850	400	9.0/±1.75
10		.2850	20K	9.0/±3
11	1V	.9000	20	9.0/±3.5
12		.9000	400	9.0/±1.75
13		.9000	20K	9.0/±3
14	3V	2.850	400	9.0/±1.75
15		2.850	20K	9.0/±3
16	10V	9.000	400	9.0/±1.75
17		9.000	20K	9.0/±3
18	30V	28.50	400	9.0/±1.75
19		28.50	20K	9.0/±4
20	100V	90.00	400	9.0/±1.75
21		90.00	20K	9.0/±4
22	300V/1000V	285.0	400	9.0/±2.75
23		285.0	20K	9.0/±11
*24		900.0	40	9.0/±4.5
*25		900.0	400	9.0/±3.75
*26		900.0	20K	9.0/+11,-16

*Connect +lead to 1000V jack on front panel.

Table 4-6. AC Current Accuracy Test

STEP	RANGE	AC CURRENT STD. OUTPUT	MOD. 303 (IND. ON SCALE 10)/TOL. (DIV.)
1	30µA	28.5µA	9.0/±2.5
2	1mA	.900mA	9.0/±2.5
3	30mA	28.5mA	9.0/±2.5
4	1A*	.900A	9.0/±2.5
5	10A*	1A	1.0/±1.0

* These two ranges are located in separate jacks on the front panel and the Range Selector must be set to the 30mA range.

Table 4-7. Resistance Range Accuracy Test

303 SWITCH SETTING		RESISTANCE DECADE BOX	303 READING (IND. ON ARC 10)/ MAX. ERROR (DIV)
FUNCTION	RANGE		
1. LP Ohms	Rx10K	Open	10.0/±0
2. LP Ohms	Rx1M	1M	.9/±1.5
3. LP Ohms	Rx1M	10M	5.0/±1.5
4. LP Ohms	Rx100K	1M	5.0/±1.5
5. LP Ohms	Rx10K	100K	5.0/±1.5
6. LP Ohms	Rx1K	10K	5.0/±1.5
7. LP Ohms	Rx100	1K	5.0/±1.5
8. LP Ohms	Rx10	100Ω	0.5/±1.5
9. LP Ohms	Rx1	100Ω	9.1/±1.5 *
10. LP Ohms	Rx1	10Ω	5.1/±1.5 *
11. LP Ohms	Rx1	1Ω	1.1/±1.5 *
12. LP Ohms	Rx1	0 (short)	0 to + 2 *
13. + and - DIODE Ohms	Rx10K	Open	10.0/±0
14. + and - DIODE Ohms	Rx1	0 (short)	0 to +2 *
15. + and - DIODE Ohms	Rx1	10Ω	5.1/±2.5 *
16. + and - DIODE Ohms	Rx1	100Ω	9.1/±2.5
17. + and - DIODE Ohms	Rx1M	1M	.9/±2.5
18. + and - DIODE Ohms	Rx1M	10M	5.0/±2.5

* Test lead resistance .2 ohms max.

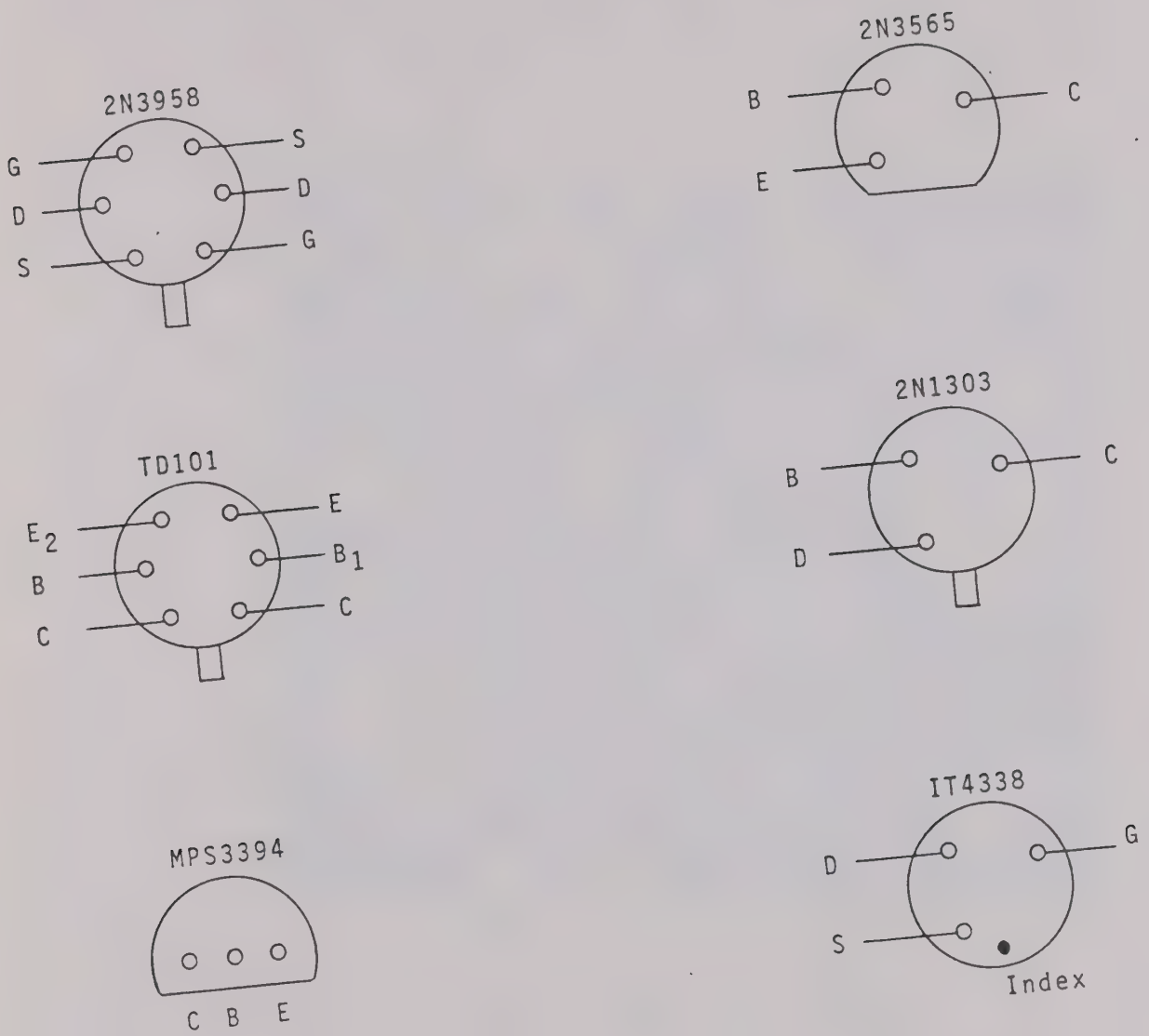


Fig. 4-2. Transistor Lead Configurations.

Model 303-3XL

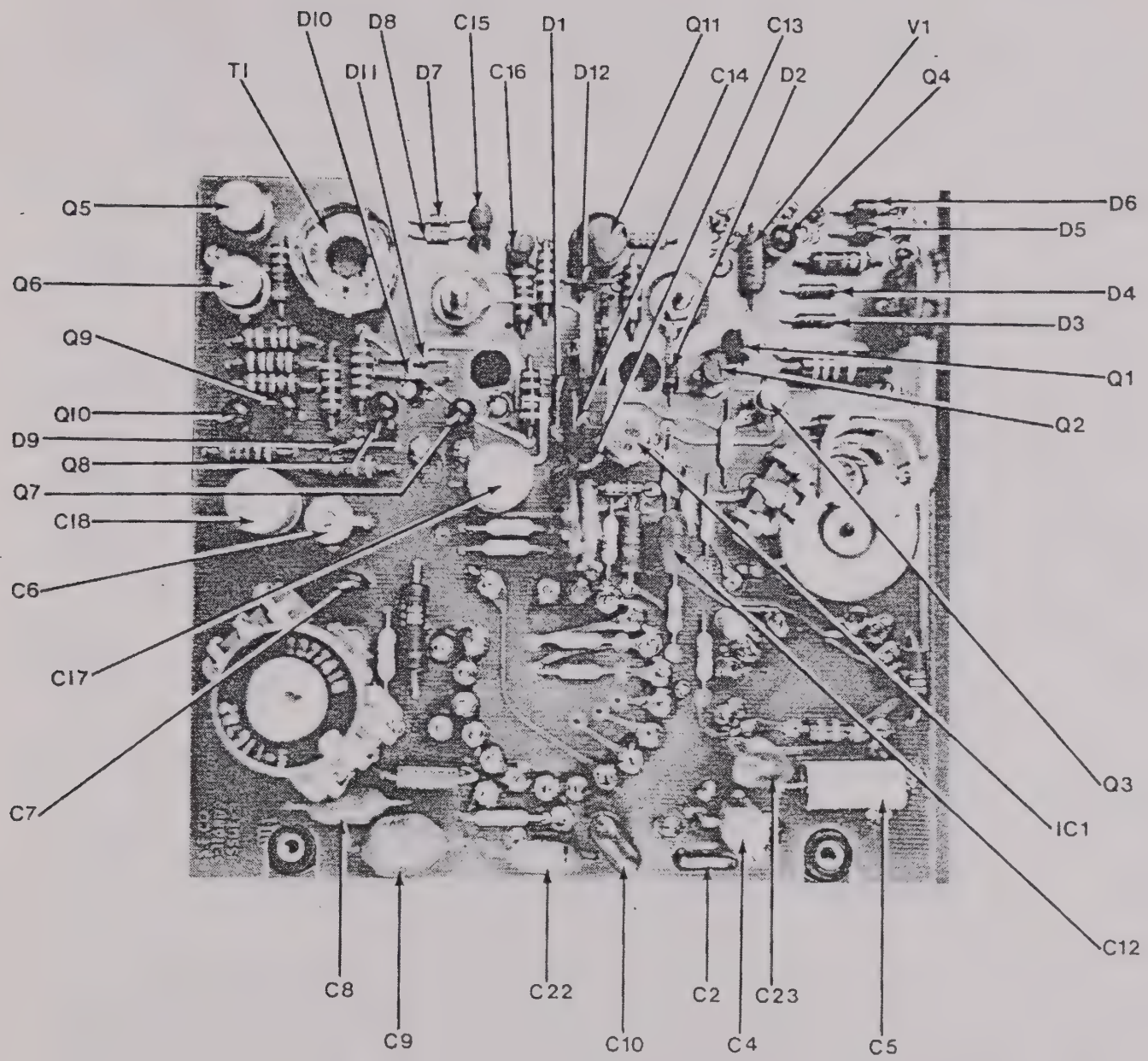


Figure 4-3A. Parts Location, Semiconductors & Inductors Model 303-3XL

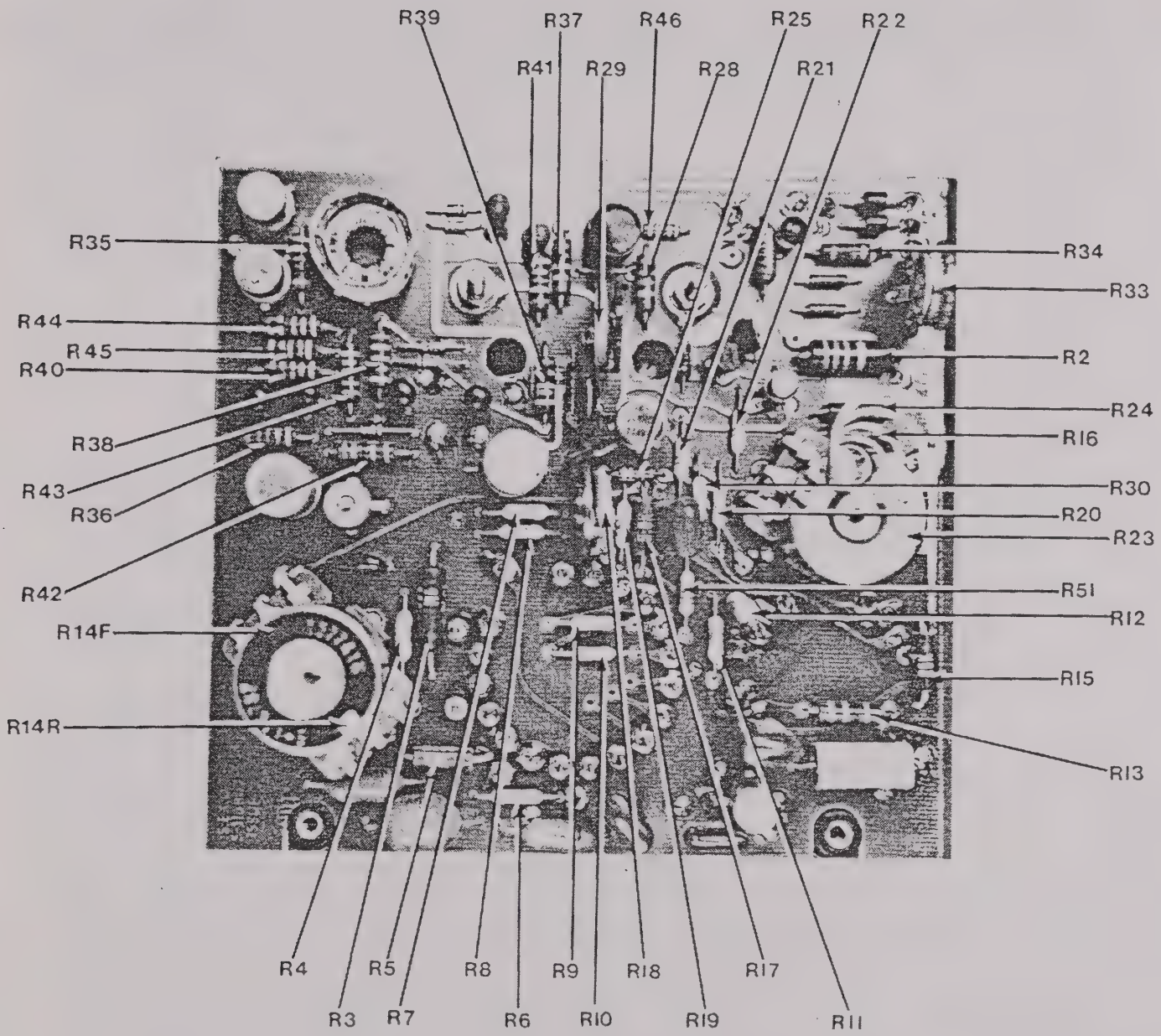


Figure 4-3B. Parts Location, Resistors Model 303-3XL

HI-POT WITHSTANDING TEST

After completing all maintenance on the Instrument and prior to returning it to the customer, it must be subjected to high-potential (hi-pot) withstanding tests. In general, these tests consist of applying elevated voltages between the powerline circuit and ground, if any (3-prong plug), and between powerline and measuring/testing circuits.

In the case of the Model 303-3XL, these tests apply only to the battery charger/adapter. If the charger/adapter was returned with the Instrument, perform the following test. If the charger/adapter was not returned with the Instrument, hi-pot testing is unneccessary.

SAFETY PRECAUTIONS FOR WORKING WITH HIGH VOLTAGES

WARNING

The following test(s) involves voltages that can be dangerous to the operator. The following precautions must be observed rigorously.

1. The "HI-POT" (high potential tester) used for these tests must be a so-called "non-destructive" type designed especially to limit the test current and to reduce the risk of injury to the operator from accidental electric shock. Avoid home-made power supplies, they can be dangerous if not designed for the purpose.

2. Do not make high voltage tests while alone. Make certain that a nearby person capable of rendering aid is being watchful.

3. Read and fully understand the operating instructions for the hi-pot tester before using it.

4. Never touch the test leads or anything connected to them until the voltage control has been returned to zero and the hi-pot tester power switch has been turned OFF.

5. The workplace must be cleared of any metal objects (except the hi-pot tester) that could be touched accidentally during testing. Keep yourself insulated from everything including grounded objects. Stand on a rubber mat over concrete or metal floor.

6. Make it a habit to keep one hand in a pocket or behind you whenever the hi-pot tester power switch is ON.

7. Place the item to be tested so that you cannot accidentally touch it while handling the hi-pot tester controls.

HI-POT TEST PROCEDURE

1. Review the safety precautions above.

2. Connect the hi-pot tester leads as shown in Figure 4-4.

3. Turn the hi-pot tester power switch ON, and adjust the voltage control rapidly but smoothly (with no overshoot) to 2240 VRMS.

4. Sustain the voltage for one minute while observing for evidence of electrical breakdown as indicated by a sudden increase of the test current, a sudden decrease or inability to increase the test voltage, the flashing of a "breakdown" lamp, or an audible crackle or sparking sound, depending on the type of hi-pot tester being used.

5. When the test is completed, or if breakdown occurs, rapidly but smoothly reduce the test voltage to zero and turn the hi-pot tester power switch to OFF.

CAUTION

Never turn the hi-pot tester power switch OFF while the test voltage is being applied. The resulting transient may damage the item being tested and a faulty unit may unknowingly be shipped to the customer.

6. When the hi-pot tester voltmeter indicates zero volts, disconnect the test leads.

7. Failure of the test indicates that the battery charger should be replaced before returning the unit to the customer.

NOTE

Hi-pot testing can be harmful to the item being tested. Do not repeat a test more than once.

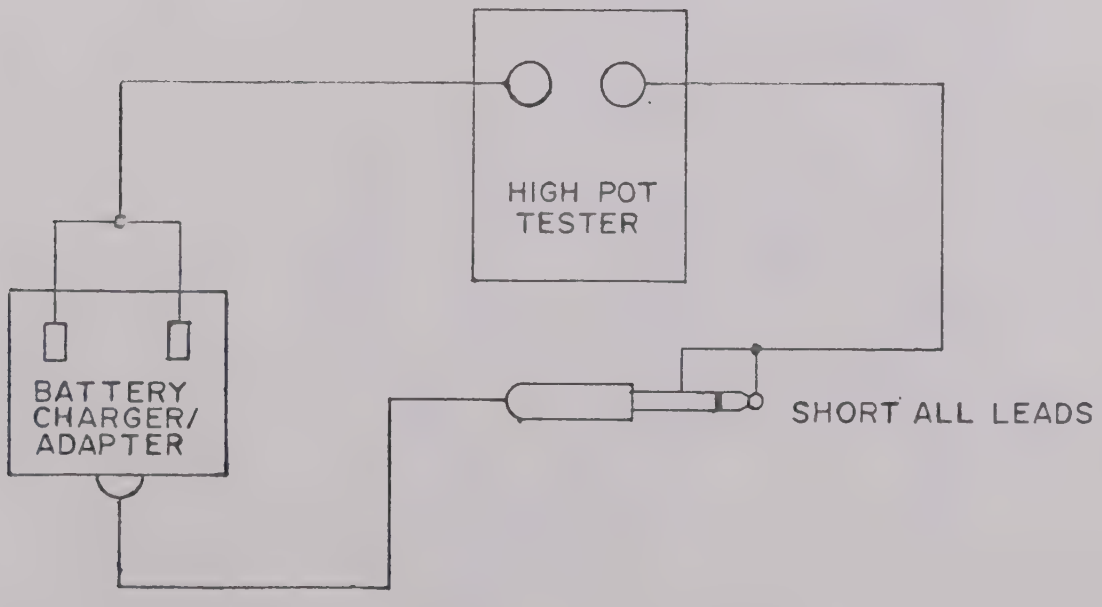
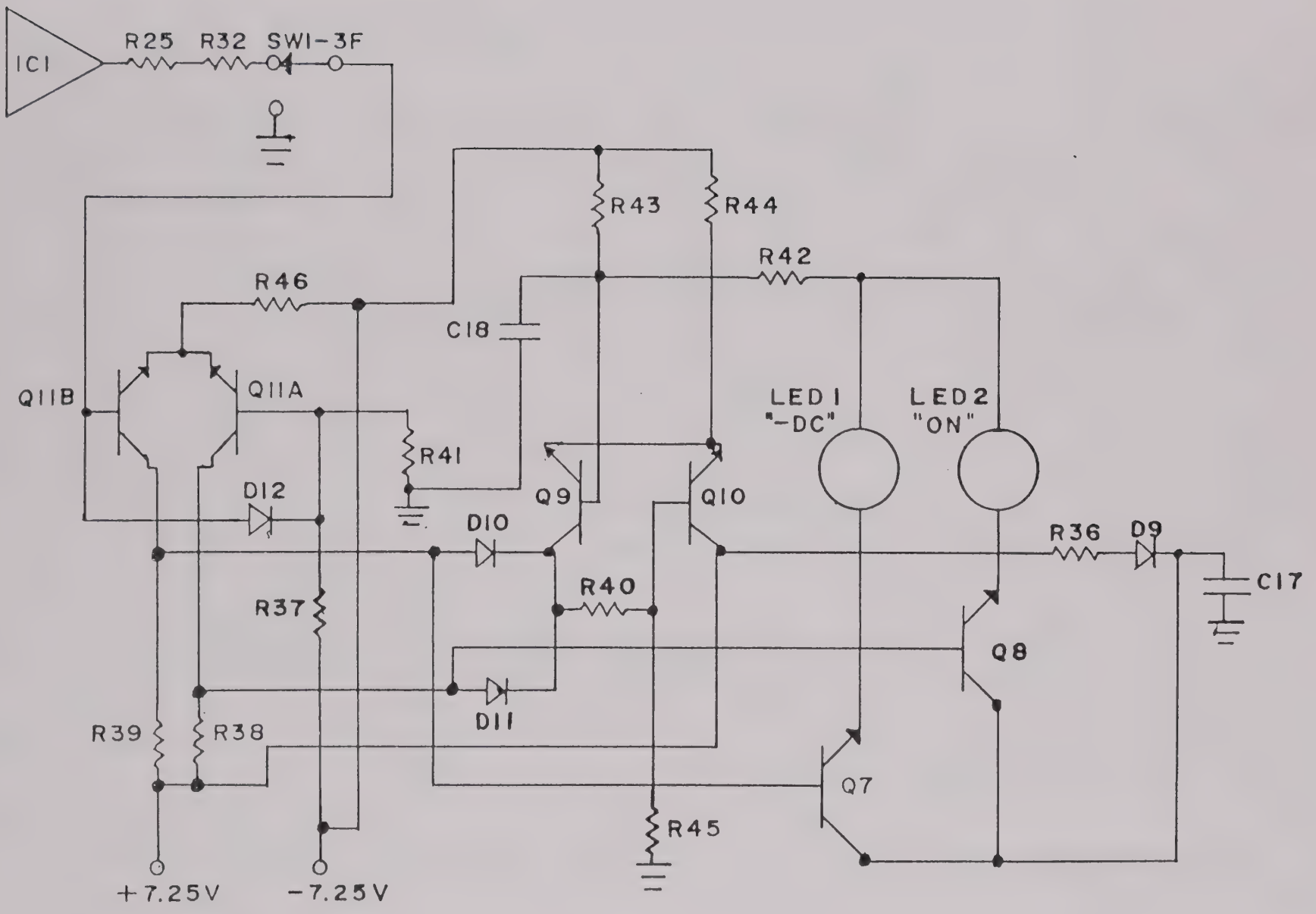
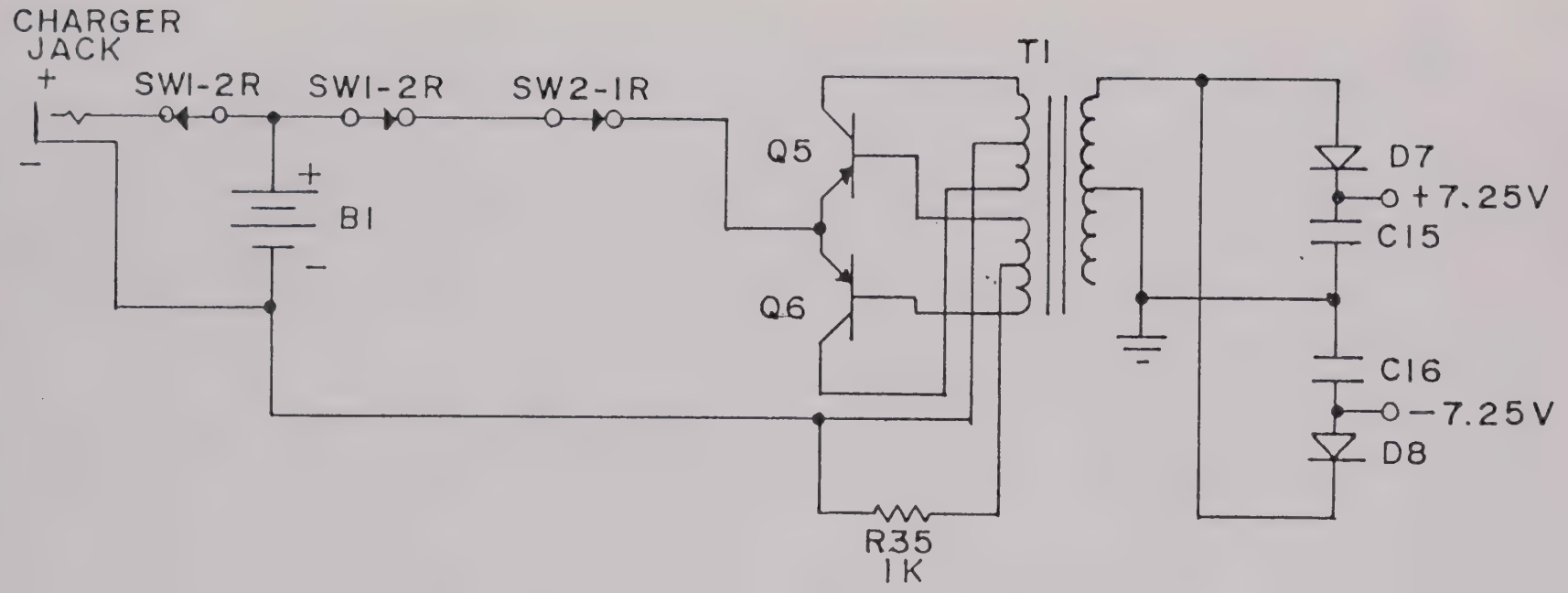


Figure 4-4. High Pot Test Setup



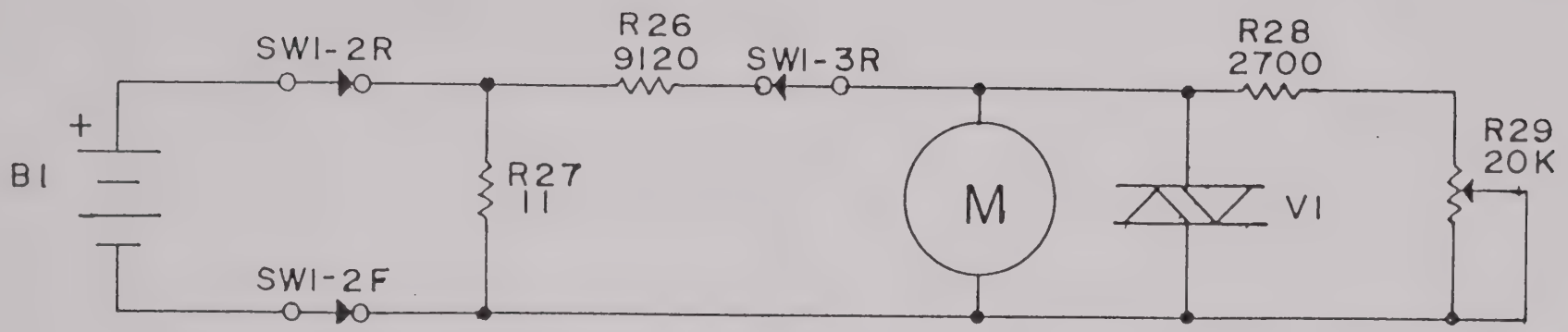
Polarity Indication Circuitry

Model 303-3XL



Power Supply Circuitry

Model 303-3XL



Battery Test Circuitry

Model 303-3XL

SIMPSON ELECTRIC COMPANY
853 DUNDEE AVENUE
ELGIN, ILLINOIS 60120
PHONE 697-2260

SOLID-STATE FET VOM

MODEL 303-3XL

PART NUMBER	DESCRIPTION		
	PC BD MAIN M303-3XL		
05-118305	RES 1.0 MEG	1/4W 5.0%	R1
01-113933	RES 33K	1.0W 10.0%	R2
05-116846	RES 9.0 MEG	1/2W 1/2%	R3
01-110735	RES 900K	1/4W 1/2%	R4
01-110737	RES 90K	1/4W 1/2%	R5
05-116845	RES 9K	1/4W 1/2%	R6
05-116844	RES 3.03K	1/4W 1.0%	R7
05-116842	RES 95.9 OHM	1/4W 1.0%	R8
05-116841	RES 90.0 OHM	1/4W 1.0%	R9
05-116843	RES 900.0 OHM	1/4W 1/2%	R10
05-115597	RES 485.0 OHM	1/4W 1.0%	R11
05-117113	RES 10.2 OHM	1/4W 1.0%	R12
05-118615	RES 10K	1/2W 5.0%	R13
05-116782	RES 10K 10%		R14F
05-116782	RES 200K 20%		R14R
01-110162	RES 25K	1/4W 1.0%	R15
05-112939	RES 123.5 OHM	1/4W 1.0%	R16
05-115681	RES 5.8K	1/4W 1.0%	R17
05-113011	POT 100K 30%		R18
05-117115	RES 562.0 OHM	1/4W 1.0%	R19
05-116847	RES 177.0 OHM	1/4W 1/2%	R20
05-115877	RES 49.85K	1/4W 1.0%	R21
05-115877	RES 49.85K	1/4W 1.0%	R22
05-116781	POT 6K 10%		R23
01-117058	RES 1K	1/4W 1.0%	R24
05-114969	RES 270.0 OHM	1/4W 5.0%	R25
05-115920	RES 9.12K	1/4W 1.0%	R26
05-112642	RES 11.0 OHM	1/2W 5.0%	R27
05-118919	RES 2.7K	1/2W 5.0%	R28
05-116850	POT 20K 30%		R29
05-116848	RES 724.8 OHM	1/4W 1.0%	R30
05-118257	RES 5.6K	1/4W 5.0%	R32
05-117305	POT 5K 30%		R33

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MODEL 303-3XL

PART NUMBER	DESCRIPTION		
05-118602	RES 1K	1/2W 5.0%	R34
05-118602	RES 1K	1/2W 5.0%	R35
05-118606	RES 2.2K	1/2W 5.0%	R36
05-114982	RES 180K	1/2W 5.0%	R37
01-111935	RES 27K	1/2W 5.0%	R38
01-111935	RES 27K	1/2W 5.0%	R39
05-118646	RES 47K	1/2W 5.0%	R40
05-119350	RES 2.4K	1/2W 5.0%	R41
05-118588	RES 56.0 OHM	1/2W 5.0%	R42
06-110380	RES 18K	1/2W 5.0%	R43
01-111935	RES 27K	1/2W 5.0%	R44
05-118646	RES 47K	1/2W 5.0%	R45
05-113628	RES 47K	1/4W 5.0%	R46
05-119201	RES 3.0 OHM	1.0W 1.0%	R47
05-116849	RES 31.94 MEG	1.0W 1.0%	R48
10-650150	SHUNT ASSEM 1.0 AMP		R49
03-812006	SHUNT ASSEM 10 AMP		R50
05-117114	RES 627.4 OHM	1/4W 1.0%	R51
01-114872	CAP 0.01 µF 500V		C1
05-116824	CAP 12.0 pV 500V		C2
05-116825	CAP 18.0 pF 500V		C3
05-116838	CAP 3-20 pF 500V		C4
05-110738	CAP 0.1 µF 400V		C5
05-116838	CAP 3-20 pF 500V		C6
05-116827	CAP 82.0 pF 500V		C7
05-116829	CAP 1.1K pF 33V		C8
05-116828	CAP 1.10 pF 33V		C9
05-116858	CAP 0.12 µF 100V		C10
05-116826	CAP 5.0±.5pF 500V		C11
05-113612	CAP 0.1 µF 100V		C12
05-116823	CAP 6.0 pF 500V		C13
05-116823	CAP 6.0 pF 500V		C14
05-115534	CAP 15.0 µF 20V		C15
05-115534	CAP 15.0 µF 20V		C16
05-117208	CAP 220.0 µF 10V		C17

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PART NUMBER	DESCRIPTION	
05-117208	CAP 220.0 µF 10V	C18
05-117138	CAP 3.3 pF 1000V	C19
05-113760	CAP 0.005µF 3000V	C20
05-180504	SPRING COMPRESSION	
05-117212	CAP 10.0 pF 500V	C21
05-117140	CAP 390.0 pF 63V	C22
05-113612	CAP 0.1 µF 100V	C23
05-113215	CAP 0.01 µF 100V	C24
05-116824	CAP 12.0 pF 500V	C25
05-112232	DIODE 1N695 GERM	D1
05-112232	DIODE 1N695 GERM	D2
05-115665	DIODE 1N277 or Equiv GERM	D3
05-115665	DIODE 1N277 or Equiv GERM	D4
01-110051	DIODE 10D4 SIL	D5
01-110051	DIODE 10D4 SIL	D6
05-112004	DIODE 1N914 SIL	D7
05-112004	DIODE 1N914 SIL	D8
05-112004	DIODE 1N914 SIL	D9
05-112004	DIODE 1N914 SIL	D10
05-112004	DIODE 1N914 SIL	D11
05-112004	DIODE 1N914 SIL	D12
01-110670	VARISTOR	V1
05-112631	TRANS MPS3394	Q1
05-112631	TRANS MPS3394	Q2
06-110346	TRANS 2N3955 FET	Q3
05-116856	TRANS ITE4338 FET	Q4
05-116854	TRANS 2N1303	Q5
05-116854	TRANS 2N1303	Q6
05-114689	TRANS 2N3565	Q7
05-114689	TRANS 2N3565	Q8
05-114689	TRANS 2N3565	Q9
05-114689	TRANS 2N3565	Q10
05-113035	TRANS TD101	Q11
05-112475	SPACER	
05-116853	IC UA748	IC1

10/01/81

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MODEL 303-3XL

PART NUMBER	DESCRIPTION	
05-116822	XFMR DC INVERTER M303-3XL	T1
01-112911	FUSE 2 AMP 250V 3 AG	F1
05-116774	SW 4 SECT 7 POS	SW1
05-116775	SW 3 SECT 20 POS	SW2
05-116839	PANEL OVERLAY M303-3XL	
10-862894	CASE ASSEM M303-3XL	
05-116711	HANDLE MOLDED	
05-186764	STUD 10-32 X 1/2" W SHOULDER	
05-116765	WASHER WAVE SHAPE RING	
05-116763	FASTENER "E" RING	
05-115039	BUMPER PLUG RUBBER	
05-116801	LABEL BATT & FUSE DATA 303-3XL	
10-560215	COVER ASSEM M303-3XL BATT COMP	
05-144865	SCREW 8-32 X 1/4	
05-114906	RING RETAINER "E" TYPE	
05-130815	SCREW 6-32 X 1/2"	
01-132270	SCREW 6-32 X 5/16"	
01-401862	LOCKWASHER #6	
05-115288	WASHER NYLON PLAIN	
01-131539	NUT #6-32 X 1/4"	
05-116852	NUT 3/8-32 X 1/2" ROUND	
10-863468	KNOB BAR TYPE 1/4 SHAFT HOLE	
10-863470	KNOB ROUND 1/4 SHAFT HOLE	
10-863465	KNOB BAR TYPE 1/4 SHAFT HOLE	
05-117230	LABEL BATT TYPE M303-3XL	
15-313832	REPL METER M303-3XL	
10-862889	PANEL ASSEM M303-3XL W/O METER	
10-560217	COVER ASSEM M303-3XL METER	
10-293677	ARMATURE ASSEM W/BANDS 303-3XL	
03-710221	DIAL PRINTED M303-3XL	
06-111268	SCREW 2-56 X 3/8"	
01-114131	SCREW 6-32 X 1/8"	
05-116800	DIODE LIGHT EMITTING	
05-116834	INSTRUCTION MANUAL M303-3XL	
* 00115	TEST LEAD SET	
* 00182	TEST PROBE	
* 12248	BATT CHARGER/AC ADAPTER 120V	
* 12249	BATT CHARGER/AC ADAPTER 240V	

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